



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,410	06/01/2006	Daisuke Kumaki	0553-0504	3756
26568 7590 12/19/2008				
COOK ALEX LTD				
SUITE 2850				
200 WEST ADAMS STREET				
CHICAGO, IL 60606				
EXAMINER				
BOWMAN, MARY ELLEN				
ART UNIT		PAPER NUMBER		
2879				
MAIL DATE		DELIVERY MODE		
12/19/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/581,410

Applicant(s)

KUMAKI ET AL.

Examiner

MARY ELLEN BOWMAN

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2006.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-31 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 01 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/CIS)
Paper No(s)/Mail Date 6/1/06
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in International Application No. PCT/JP05/18226, filed 26 September 2005.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 1 June 2006 was considered by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 27 and 28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 27 and 28, Examiner is unable to examine the claims on their merits. The language of the claims cites a "difference in molar ratio", but then presents the difference as "in the range of 80%". 80% is not a range, nor is it a "difference", therefore, the claims do not particularly point out and distinctly claim the subject matter which the applicant regards as his invention, and cannot be properly examined on the merits.

Claim Rejections - 35 USC § 102

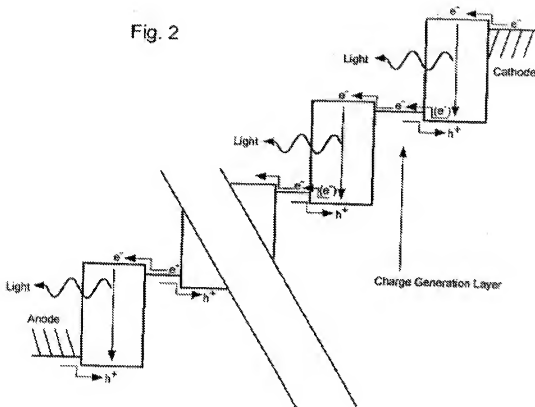
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-26 and 29-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Kido et al., USP App. Pub. No. 2003/0189401 A1, published October 9, 2003 (hereinafter referred to as “Kido”).

Regarding claim 1, Kido discloses a light emitting element comprising: a first electrode and a second electrode (e.g., Fig. 2 below, cathode and anode); **a first layer and a second layer each containing an organic material and an inorganic material** (see Figure 2 below, there are two hole transporting layers; and [0028]; “it is desirable for the charge generation layer to include a laminated and/or a mixed layer including an organic compound...and an inorganic...material”); **a third layer containing a light emitting material** (e.g., Figure 2, light emitting layer); **and a fourth layer generating electrons** (e.g., [0041]; “an electron injection layer having a mixture including an organic compound and a metal functioning as an electron donating dopant”), **wherein the first layer is in contact with the first electrode, the second layer is in contact with the second electrode, the third layer is provided between the first electrode and the second electrode with the first layer and the second layer respectively therebetween, and the fourth layer is provided between the third layer and the second layer** (e.g., Figure 2 below).



Regarding claim 9, Kido discloses a light emitting element comprising: a first electrode and a second electrode (e.g., Fig. 2 above, cathode and anode); a first layer and a second layer each generating holes (see Figure 2 above, there are two hole transporting layers; and [0028]; “it is desirable for the charge generation layer to include a laminated and/or a mixed layer including an organic compound having...a hole transporting property [i.e., hole generating layer]...and an inorganic...material”); a third layer containing a light emitting material (e.g., Figure 2, light emitting layer); and a fourth layer generating electrons (e.g., [0041]; “an electron injection layer having a mixture including an organic compound and a metal functioning as an electron donating dopant”), wherein the first layer is in contact with the first electrode,

the second layer is in contact with the second electrode, the third layer is provided between the first electrode and the second electrode with the first layer and the second layer respectively therebetween, and the fourth layer is provided between the third layer and the second layer (e.g., Figure 2 above).

Regarding claim 13, Kido discloses a light emitting element comprising: a first electrode and a second electrode (e.g., Fig. 2 above, cathode and anode); a first layer and a second layer each containing a P-type semiconductor (see Figure 2 above, there are two hole transporting layers; and [0028]; "it is desirable for the charge generation layer to include a laminated and/or a mixed layer including an organic compound having...a hole transporting property [i.e., P-type semiconductor]...and an inorganic...material"); a third layer containing a light emitting material (e.g., Figure 2, light emitting layer); and a fourth layer containing an N-type semiconductor (e.g., [0041]; "an electron injection layer having a mixture including an organic compound and a metal functioning as an electron donating dopant [i.e., N-type semiconductor]"), wherein the first layer is in contact with the first electrode, the second layer is in contact with the second electrode, the third layer is provided between the first electrode and the second electrode with the first layer and the second layer respectively therebetween, and the fourth layer is provided between the third layer and the second layer (e.g., Figure 2 above).

Regarding claim 21, Kido discloses a light emitting element comprising: a first electrode and a second electrode (e.g., Fig. 2 above, cathode and anode); a first layer and a second layer each containing a first organic compound and a material which accepts electrons of the first organic compound (see Figure 2 above, there are two hole transporting

layers; and [0028]; “it is desirable for the charge generation layer to include a laminated and/or a mixed layer including an organic compound having...a hole transporting property [i.e., hole generating layer]...and an inorganic...material [i.e., which accepts the electrons of the organic material]”); **a third layer containing a light emitting material** (e.g., Figure 2, light emitting layer); **and a fourth layer containing a second organic compound and a material which donates electrons to the second organic compound** (e.g., [0041]; “an electron injection layer having a mixture including an organic compound and a metal functioning as an electron donating dopant”), wherein the first layer is in contact with the first electrode, the second layer is in contact with the second electrode, the third layer is provided between the first electrode and the second electrode with the first layer and the second layer respectively therebetween, and the fourth layer is provided between the third layer and the second layer (e.g., Figure 2 above).

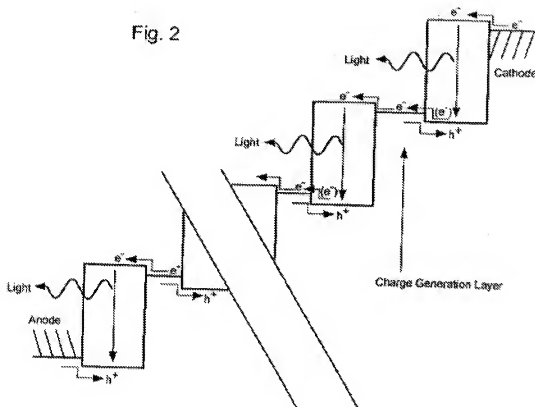
Regarding claims 2 and 22, Kido discloses the inventions as explained above regarding claims 1 and 21 respectively, and further discloses **the organic material (the first organic compound) is a hole transporting organic compound** [0028]; “it is desirable for the charge generation layer to include a laminated and/or a mixed layer including an organic compound having...a hole transporting property”).

Regarding claims 3, 14 and 23, Kido discloses the inventions as explained above regarding claims 1, 13 and 21 respectively, and further discloses **the inorganic material (the P-type semiconductor; the material which accepts electrons) is a metal oxide** (e.g., [0033]; “the inorganic material can be a metal oxide”).

Regarding claims 4, 15 and 24, Kido discloses the inventions as explained above regarding claims 3, 13 and 23 respectively, and further discloses **the metal oxide (the P-type semiconductor) is one or more compounds selected from the group consisting of vanadium oxide, molybdenum oxide, cobalt oxide, and nickel oxide, zinc oxide, indium oxide, tin oxide, antimony oxide, and tungsten oxide** (e.g., [0035]; “the metal oxide can be vanadium pentaoxide”).

Regarding claims 6, 10, 18 and 29, Kido discloses the inventions as explained above regarding claims 1, 9, 13 and 21 respectively, and further discloses **the thickness of each of the first layer and the second layer is 30 nm to 1 μ m** (e.g., [0052]; “a hole injection layer including an electron accepting compound and having a thickness of not more than 30 nm [i.e., including 30 nm, which is within the claimed range]”; see also Figure 2, there are two hole transporting layers, one on either side of the light emitting layer).

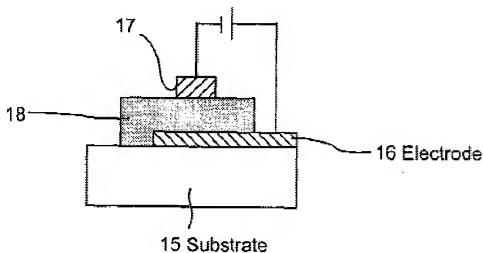
Fig. 2



Regarding claims 7, 11, 19 and 30, Kido discloses the inventions as explained above regarding claims 1, 9, 13 and 21 respectively, and further discloses **the thickness of the second layer is 50% to 150% of the thickness of the first layer, and the thickness of the first layer is 50% to 150% of the thickness of the second layer** (e.g., [0052]; “a hole injection layer including an electron accepting compound and having a thickness of not more than 30 nm [i.e., including 30 nm, which is within the claimed range]”; see also Figure 2, there are two hole transporting layers, one on either side of the light emitting layer, and they are each of the thickness not more than 30 nm).

Regarding claims 8, 12, 20 and 31, Kido discloses the inventions as explained above regarding claims 1, 9, 13 and 21 respectively, and further discloses **t voltage is applied so as to make the light emitting element emit light, the electrode applied with higher potential is the first electrode, and the electrode applied with lower potential is the second electrode** (e.g., Figure 34 below, higher potential applied to first electrode, lower potential applied to second electrode, denoted by conventional circuitry).

Fig. 34



Regarding claim 16, Kido discloses the invention as explained above regarding claim 13, and further discloses **the N-type semiconductor is a metal oxide** (e.g., [0041]; “an electron injection layer [i.e., N-type semiconductor] having...a metal functioning as an electron donating dopant” and [0033]; “the inorganic material [i.e., the metal included in any of the charge generation layers] can be a metal oxide”).

Regarding claim 17, Kido discloses the invention as explained above regarding claim 13, and further discloses **the N-type semiconductor is one or more compounds selected from the group consisting of zinc oxide, zinc sulfide, zinc selenide, and titanium oxide** (e.g., [0033]; “the inorganic material [i.e., the metal in a charge generation layer] can be a metal oxide” and [0047]; “metal to include at least one selected from...titanium”).

Regarding claim 25, Kido discloses the invention as explained above regarding claim 21, and further discloses **the second organic compound is an electron transporting organic compound** (e.g., [0028]; “the charge generation layer to include...an organic compound...[with] a hole transporting property or an electron donating property; and an inorganic...material capable of forming a charge transfer complex”).

Regarding claim 26, Kido discloses the invention as explained above regarding claim 21, and further discloses **the material which donates electrons is an alkali-metal, an alkaline-earth metal, or a rare earth metal** (e.g., [0042]; “the electron donating dopant can include at least one metal selected from a group including an alkaline metal, an alkaline earth metal and a rare earth metal”).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kido in view of Arai, USPN 6, 249, 085 B1, published June 19, 2001 (hereinafter referred to as “Arai”).

Regarding claim 5, Kido discloses the invention as explained above regarding claim 1, but fails to teach the inorganic material may be a metal nitride.

In the same field of endeavor of OLEDs, Arai teaches **the inorganic material is one selected from indium nitride, tin nitride, antimony nitride, and molybdenum nitride, a tungsten nitride; or two or more inorganic materials selected therefrom** (c.g., col 3, lines 41-50; “nitride... of said metal...Sn...Mo”). Arai further teaches that metal nitrides and metal oxides may be used interchangeably as hole transporting materials in organic EL displays (col 3, lines 37-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a metal nitride as an inorganic hole transporting material, such as those taught by Arai, in lieu of the metal oxides disclosed by Kido, because metal nitrides are well known and suitable substitutes for metal oxides in organic EL displays.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571) 270-5383. The examiner can normally be reached on Monday-Thursday, 7:30 a.m.-6:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./
Examiner, Art Unit 2879

/NIMESHKUMAR D. PATEL/
Supervisory Patent Examiner, Art Unit 2879